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CLAIMS

[Claim(s)]

[Claim 1] movement to which it became from the sheet-like polyurethane-rubber Plastic solid, and the toner adhered -- a member -- the blade for image formation equipments characterized by composite-izing the low friction stratum which is the blade for image formation equipments which **** a front face, and carried out the plasma polymerization of the carbon to the aforementioned polyurethane-rubber Plastic-solid front face

[Claim 2] a claim 1 -- setting -- the aforementioned low friction stratum -- the metal mold of the aforementioned polyurethane-rubber Plastic solid -- the blade for image formation equipments characterized by being formed in a field or the air contact surface

[Claim 3] It is the blade for image formation equipments characterized by forming the aforementioned low friction stratum in the apical surface of the aforementioned polyurethane-rubber Plastic solid in a claim 2.

[Claim 4] claims 1, 2, or 3 -- setting -- the aforementioned low friction stratum -- metal mold -- the blade for image formation equipments characterized by being formed succeeding a field, an apical surface, and the air contact surface

[Claim 5] movement to which it became from the polyurethane-rubber Plastic solid, and the toner adhered -- a member -- **** for image formation equipments which **** a front face -- **** for image formation equipments characterized by composite-izing the low friction stratum which is a member and carried out the plasma polymerization of the carbon to the aforementioned polyurethane-rubber Plastic-solid front face -- a member

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention -- movement of the photo conductor of the shape of the shape of a drum, and a belt, the roll in a development unit, etc. -- a member -- it is related with the blade used more for a detail as the cleaning blade which carries out cleaning removal of the toner adhering to the photo conductor front face after an imprint process, a toner electrification blade which the roll front face in a development unit is ****(ed) [blade], and electrifies a toner about the blade for image-formation equipments and the **** member which **** a front face

[0002]

[Description of the Prior Art] The blade for image formation equipments consists of a polyurethane-rubber Plastic solid of the shape for example, of a film, is in the state fixed to suitable holddown members, such as a blade electrode holder, for example, is used as a cleaning blade or toner electrification blades, such as a copying machine, a printer, or compound OA equipment having these functions, etc.

[0003] As conventional cleaning PUREDO, for example, a fatty-acid amide (a carbon number 16 - 24 unsaturated-fatty-acid amide) with bad compatibility is added to the polyurethane rubber of a molding material, and there is a blade which formed the low friction stratum in the front face using the fatty-acid amide which deposits gradually after fabrication (refer to JP,4-58630,B).

[0004] Although it cries since a photo conductor is ****(ed) (generating of an allophone) and is effective to prevention in this cleaning blade in order that BURIMINGU [interior / of a blade / lubricant] with time, since coefficient of friction rises with time, the effect which suppresses wear of a photo conductor is small.

[0005] Moreover, a polyurethane rubber and fluorine system lubricant, such as a perfluoro alkyl ethyleneoxide addition product, are kneaded and fabricated, and the blade to which coefficient of friction was reduced is known (refer to JP,57-201275,A).

[0006] In order that lubricant may mix between bridge formation of a thermosetting polyurethane resin and this blade may cut bridge formation, when a blade is continued and used for a long period of time, it has the problem that a blade material deteriorates gradually and a cleaning performance falls.

[0007] Moreover, the compound blade of the low friction nature which elastic members, such as a polyurethane rubber, were made to paste up or pinch comparatively thin lubricous blade material, and reinforced it is known (refer to JP,58-203480,A).

[0008] With this blade, if it is used for a long period of time, lubricous blade material will exfoliate from an elastic member, consequently coefficient of friction increases, and the burr of the cleaning blade by low friction and the effect of the friction prevention on the front face of a photo conductor cannot be acquired.

[0009] Moreover, after applying to the inside of metal mold the silicone oil which has active hydrogen at the end, liquefied polyurethane is poured in into it and the blade containing the polymer to which a silicone oil and polyurethane reacted to the front face of a polyurethane-rubber Plastic solid is known (refer to JP,59-15967,A).

[0010] Although this blade contains the polymer of low friction nature homogeneously in the surface of a rubber Plastic solid, since coefficient of friction of a blade is not reduced so much, the effect of preventing the wear with time on the blade itself and the front face of a photo conductor is not large.

[0011] furthermore -- while carrying out high-speed rotation of the metal mold of the centrifugal molding machine which applied the release agent to the inside -- the metal mold -- a liquefied polyurethane rubber is slushed into a field and the fabricated centrifugal molding blade is known this blade -- metal mold -- a blade electrode holder is pasted up on the contact surface, and the opposite side is used as *****

[0012] However, the long low friction stratum of a life was not able to be obtained by this method. moreover, the metal mold of a centrifugal molding machine -- since the release agent was beforehand applied to the inside and the release agent had sunk into the surface of the rubber Plastic solid obtained, it was difficult to paste up a blade electrode holder directly as it is Therefore, in order to improve an adhesive property with a electrode holder, the release agent of a Plastic-solid surface needed to be removed, for example, the surface of a rubber Plastic solid had to be washed about 3 times, and it had led to improvement in a manufacturing cost.

[0013] Thus, the lubricant which cannot hold sliding frictional force small or is contained in a blade carried out bleeding of the conventional cleaning blade by continuing at a long period of time, or it had the problem of being as a low friction stratum exfoliating easily **** [and]. [degrading a blade material] Namely, with the blade of the type [BURIMINGU / lubricant / type], sliding frictional force cannot be made small with time. If a photo conductor front face will be polluted with the blade of the

type in which lubricant carries out bleeding to lubricant, and the physical properties of a blade material deteriorate with time or lubricous blade material exfoliates. The edge portion of a cleaning blade will get turned up, or the abrasion loss on the front face of a photo conductor will increase, and a photo conductor front face will be damaged depending on the case.

[0014]

[Problem(s) to be Solved by the Invention] Then, this invention makes it a technical problem to offer the blade for image formation equipments and **** member which it not only decreases the abrasion loss of the blade itself, but were excellent in lubricity, endurance, cleaning nature, etc. in view of the situation mentioned above.

[0015]

[Means for Solving the Problem] movement to which the 1st mode of this invention which solves the aforementioned technical problem became from the sheet-like polyurethane-rubber Plastic solid, and the toner adhered -- a member -- it is in the blade for image formation equipments characterized by composite-izing the low friction stratum which is the blade for image formation equipments which **** a front face, and carried out the plasma polymerization of the carbon to the aforementioned polyurethane-rubber Plastic-solid front face

[0016] the 2nd mode of this invention -- the 1st mode -- setting -- the aforementioned low friction stratum -- the metal mold of the aforementioned polyurethane-rubber Plastic solid -- it is in the blade for image formation equipments characterized by being formed in a field or the air contact surface

[0017] The 3rd mode of this invention has the aforementioned low friction stratum in the blade for image formation equipments characterized by being formed in the apical surface of the aforementioned polyurethane-rubber Plastic solid in the 2nd mode.

[0018] the 4th mode of this invention -- the mode of the 1st, and 2 or 3 -- setting -- the aforementioned low friction stratum -- metal mold -- it is in the blade for image formation equipments characterized by being formed succeeding a field, an apical surface, and the air contact surface

[0019] movement to which the 5th mode of this invention became from the polyurethane-rubber Plastic solid, and the toner adhered -- a member -- **** for image formation equipments which **** a front face -- it is in the **** member for image formation equipments characterized by composite-izing the low friction stratum which is a member and carried out the plasma polymerization of the carbon to the aforementioned polyurethane-rubber Plastic-solid front face

[0020] The liquefied polyurethane rubber used as a material of the polyurethane-rubber Plastic solid of this invention is compounded from the poly isocyanate and the polyol of average molecular weight 1000-4000, and is fabricated, using the polyol and polyamine of low molecular weight as a curing agent.

[0021] As a poly isocyanate here 2, 4-tolylene diisocyanate, 1, 5-naphthylene diisocyanate, o-tolidine di-isocyanate (3, 3'-dimethyl diphenyl -4, 4'-diisocyanate), Aromatic diisocyanate, such as 4 and 4'-diphenylmethane diisocyanate, Aliphatic diisocyanate, such as 1 and 6-hexane diisocyanate, isophorone diisocyanate, Aralkyl diisocyanate, such as cycloaliphatic diisocyanate, such as 4 and 4'-dicyclohexylmethane diisocyanate, and xylylene diisocyanate, etc. can be mentioned.

[0022] As a polyol of average molecular weight 1000-4000, there is a polyester polyol obtained to ethylene glycol, propylene-glycol, 1, 4-butylene-glycol, 1, 5-pentylene glycol, 1, and 6- according to the condensation more than a kind of polyols, such as a xylene glycol and 3-methyl-1,5-pentanediol, and more than a kind of multiple-valued carboxylic acids, such as multiple-valued carboxylic acids, such as aliphatic series, such as an adipic acid and a phthalic acid, or an aromatic dicarboxylic acid. The hydroxy polycarbonate which has a hydroxyl group in addition to this at the end (one side or both) obtained according to condensation of a polyol and a phosgene, the hydroxy polyester obtained according to the ring breakage addition polymerization of epsilon-caprolactone, the polyoxy alkylene glycol which alkylene oxide added to various active hydrogen compounds, the polyoxy tetramethylene glycol obtained according to the ring breakage addition polymerization of a tetrahydrofuran can be mentioned.

[0023] As a low-molecular polyol, aromatic dihydric alcohol, such as alicyclic dihydric alcohol [, such as aliphatic polyhydric-alcohol /, such as a trimethylol propane and a pentaerythritol, /, 1, 4-cyclohexane diol, 1, and 4-cyclohexane dimethanol,], p-xylylene glycol, 1, and 4-screw (beta-hydroxy ethoxy) benzene, etc. can be mentioned other than a diol which was mentioned above. Moreover, ethylenediamine, a propylenediamine diethylenetriamine, etc. can be mentioned as low-molecular polyamine.

[0024] In addition, independent or two sorts or more can be mixed and used for these polymerization components and curing agents.

[0025] The low friction stratum composite-ized by the front face of a polyurethane-rubber Plastic solid at this invention is a layer formed by carrying out a plasma polymerization, and can call carbon so-called DLC (diamond-like carbon) layer. Using plasma treatment equipment, using CH₄ as material gas, a DLC layer can pass CH₄ 30 to 100 CCM in the state of the temperature of 20-25 degrees C, degree of vacuum 0.1 Torr, and the RF (RF) power 100-300W, and can form it in the membrane formation time 20 - 100 minutes. As for the thickness of a DLC layer, 10 micrometers or less of things 5 micrometers or less are used preferably.

[0026] Here, an example of the plasma CVD equipment used in order to form the DLC layer of this invention is explained, referring to drawing 4 . It is parallel monotonous type RF plasma CVD equipment which is shown in drawing 4 , and in the chamber 101, a grounding electrode 102 and RF electrode 103 carry out phase opposite, and are arranged, and the matching electrode 104 and RF generator 105 are connected to RF electrode 103. Moreover, the heater 106 is held at RF electrode 103, and a substrate 107 is arranged on it. On the other hand, the exhaust air system which consists of a bulb 108 and an exhaust air pump 109, and the gas supply system which consists of the mass-flow controllers 110A and 110B, bulbs 111A and 111B, and

process chemical cylinders 112A and 112B are connected to the chamber 101. In such equipment, if RF power (13.56MHz which is general commercial frequency) is impressed to RF electrode 103 and the pressure in a chamber 101 is set to about several 100 mTorr, plasma will occur between the grounding electrodes 102 and RF electrodes 103 which were grounded. RF electrode 103 is heated at a heater 106 to suitable temperature (especially in the case of, this invention changed according to the quality of the material of a substrate from 100 degrees C or less to about 500 degrees C, it is not necessary to heat), a substrate 107 is installed on it, and if it is a simple substance or hydrocarbon system gas (CH₄, C₂H₆ grade) is introduced with hydrogen gas from a gas supply system, the carbon thin film called DLC will be formed on a substrate 107. The degree of hardness of a DLC layer rises as membraneous control is attained and a processing temperature rise is carried out by changing the processing temperature of a substrate 107.

[0027] Manufacture of the polyurethane-rubber Plastic solid used by this invention can be manufactured by for example, the centrifugal casting method and the injection molding method.

[0028] the metal mold of a polyurethane-rubber Plastic solid -- in using as ***** the front face fabricated at the field side, in order to make good the mold-release characteristic of the polyurethane-rubber Plastic solid of the shape of a sheet fabricated -- metal mold -- it is desirable to form a mold release layer in a front face This mold release layer RTV (room temperature vulcanizing), Silicone rubber, such as LTV (lowtemperature vulcanizing) the silicone resin by which solvent dilution was carried out -- metal mold -- the method of carrying out a coat inside and forming a silicone system mold release layer in it -- fluororesins, such as a polytetrafluoroethylene (PTFE) and polyperfluoro alkyl acrylate (PFA), -- metal mold -- the method of carrying out a coat inside and forming a fluorine system mold release layer in it -- Mineral matters, such as molybdenum disulfide, graphite, and graphite fluoride, boron nitride, a tungsten disulfide, and talc, a binder (for example, a polyurethane rubber, a ***** resin, and phenol resin --) an alkyd resin etc. -- solvents (for example, toluene, butyl acetate, ethyl acetate, a methyl ethyl ketone, a methyl isobutyl ketone, etc.) -- diluting -- metal mold -- it can form by the method of carrying out a coat inside and forming a mineral-matter system mold release layer in it etc.

[0029] the case where the blade for image formation equipments in the case of using as ***** the front face fabricated at the air contact surface side of a polyurethane-rubber Plastic solid is manufactured -- metal mold -- what is necessary is just to pour in the liquefied polyurethane rubber which added the curing agent inside

[0030] If it adopts a casting centrifugal method in manufacturing especially a thing with a thickness of about 3mm or less when fabricating a polyurethane-rubber Plastic solid, it is efficiently producible in large quantities. Since the cylinder-like polyurethane rubber sheet fabricated by the centrifugal heart fabricating method will turn into a flat sheet if one of them is cut and extended to shaft orientations, the polyurethane-rubber Plastic solid used as the material of the blade for image formation equipments can be obtained by cutting this in suitable size and a configuration.

[0031] thus, the low friction stratum formed in the cut polyurethane-rubber Plastic solid -- at least -- ***** -- forming -- *****ing -- metal mold -- on the other hand, there are the contact surface and the air contact surface -- it is -- it forms in both sides Moreover, it is desirable to form in a ***** end face anyway in this case.

[0032] In using the blade for image formation equipments of this invention as a cleaning blade, it incorporates and uses it for the cleaning unit between the imprint units of an electrostatic latent image and the electrification machines of a photo conductor in image formation equipment.

[0033] Since the blade for image formation equipments of this invention has the DLC layer, the abrasion loss of itself decreases, and it is excellent in lubricity, endurance, cleaning nature, etc., and, moreover, does not pollute a photo conductor. That is, since a DLC layer is not what used lubricant, it does not have OPC contamination, since the DLC layer is composite-ized by a polyurethane rubber and molecular binding, it is durable, and a cleaning performance does not fall with time. Moreover, when using as a toner electrification blade, there is almost no adhesion of a toner, and the life of a development unit can be prolonged sharply. Moreover, the DLC layer unified on a polyurethane-rubber Plastic solid and molecule level can form comparatively easily by using plasma treatment equipment.

[0034]

[Embodiments of the Invention] Hereafter, although the gestalt of operation explains this invention to a detail further, the gestalt of these operations does not limit the range of this invention at all.

[0035] (Gestalt 1 of operation) The bore of 120cm in which a rotation drive is carried out by rotation driving means, and the centrifugal molding equipment which has the metal mold made of the steel of the shape of a drum with a depth of 80cm were used. In order to make easy mold release of the Plastic solid after fabrication at the inside of metal mold, liquefied LTV silicone rubber is coated and the mold release layer is formed beforehand.

[0036] On the other hand, as a liquefied polyurethane rubber, after dehydrating the condensation polyester (a hydroxyl value 54, NIPPORAN 4040:Japan polyurethane company make) of the molecular weight 2000 which uses ethylene glycol and an adipic acid as a polymerization component, this polyester 100 weight section was made to react for 20 minutes in 130 degrees C with the 1 and 5-naphthylene diisocyanate 18 weight section, and the prepolymer was generated.

[0037] the liquefied polyurethane rubber of the reaction mixture which added to this prepolymer, and agitated and generated to it the 1 and 4-butanediol 2 weight section which is a curing agent -- the metal mold of the aforementioned centrifugal molding machine -- it slushed inside, and it fabricated, rotating metal mold at high speed for 90 minutes in 120 degrees C

[0038] then, the above -- metal mold -- the cylinder-like polyurethane rubber Plastic solid was taken out from inside Cut the rubber Plastic solid of the shape of this cylinder to shaft orientations, developed, laid this on the surface plate, set at 110 degrees C, it was made to heat and harden further for 10 hours, and the polyurethane sheet was obtained. The degree of hardness (JIS-A

scale) of this polyurethane sheet was 80 degrees. [0039] The obtained aforementioned polyurethane sheet (2mm **) was cut to 20x218mm. This was set in plasma treatment equipment, CH₄ was passed 30 to 100 CCM in the state of the temperature of 20-25 degrees C, degree of vacuum 0.1 Torr, and the RF (RF) power 100-300W, using CH₄ as material gas, the DLC layer was formed in the membrane formation time 20 - 100 minutes, and it considered as the cleaning blade. The thickness of this DLC layer was about 3 micrometers.

[0040] Next, board thickness stuck with adhesives the cleaning blade 1 manufactured as were shown in drawing 1 and having been mentioned above on the blade electrode holder (**** zinc processing steel plate between the colds) 2 whose length is 320mm by 1.2mm, and the cleaning-blade assembly 3 which has the aforementioned low friction stratum on a surface was manufactured. In addition, DLC layer 1a is formed in the nose of cam and the whole surface of a cleaning blade 1.

[0041] Subsequently, as shown in drawing 2, it was made to contact so that DLC layer 1a of the aforementioned cleaning-blade assembly 3 may touch with the degree of tilt angle of 22 degrees on monotonous glass G, and from this upper part, the 475g force was applied in the direction of a field of monotonous glass G, and the cleaning blade 1 was forced on monotonous glass G. At this time, monotonous glass G was pulled the speed for 500mm/in the direction A, and sliding frictional force was measured. The sliding frictional force of the cleaning-blade assembly (comparison article) which did not give a DLC layer was also measured for comparison.

[0042] Consequently, the sliding frictional force of a comparison article was 623g to the sliding frictional force of the cleaning-blade assembly 3 of the gestalt of this operation which has DLC layer 1a being 483g. Thus, when the cleaning-blade assembly 3 of the gestalt of this operation has DLC layer 1a showed that sliding frictional force decreased sharply with -23%.

[0043] Next, the image formation equipment which used the cleaning-blade assembly 3 of the gestalt of this operation into the cleaning unit is explained.

[0044] As shown in drawing 3, the photo conductor (move member) 11 which rotates in the direction of an arrow (it is a clockwise rotation in drawing 3) is formed in the A image formation equipment inside of the body. Along with the hand of cut of a photo conductor 11, the electrification corotron 12, development unit 13, imprint corotron 14, ablation corotron 15, and cleaning corotron 16 **** cleaning unit 17 grade is arranged in the periphery section of this photo conductor 11. Moreover, in the development unit 13, photo conductor 11 front face is attended, the development magnet roll 18 is arranged, and the toner 19 is contained by the pars basilaris ossis occipitalis of the development unit 13. Furthermore, the cleaning-blade assembly 3 grade of this invention which consists of a blade electrode holder 2 formed with the DESUTA bar brush 20, aforementioned cleaning PUBUREDO 1, a cold rolling zinc processing steel plate, etc. is included in the cleaning unit 17.

[0045] In addition, in drawing 3, the development unit 13 may adjoin and arrange in the periphery section of a photo conductor 11 two or four units which contained the plurality of a Magenta, yellow, a cyano toner, and a black toner, respectively, although only one unit is illustrated.

[0046] Next, operation of the aforementioned image formation equipment A with which the aforementioned cleaning-blade assembly 3 was incorporated is explained.

[0047] First, a charge is electrified on photo conductor 11 front face by the electrification corotron 12. Subsequently, rotating the development magnet roll 18 in the development unit 13, after irradiating a laser beam L from the optical system for exposure (not shown), exposing photo conductor 11 front face and writing out image information, a toner 19 is made to adhere to photo conductor 11 front face, and a toner image is formed on a photo conductor 11.

[0048] Next, the form carried out ** 10 from a feed mechanism (not shown) is supplied between a photo conductor 11 and the imprint corotron 14, by the imprint corotron 14, electrostatic charge with the reverse electrification polarity of photo conductor 11 front face is electrified in a form, and the aforementioned toner image is imprinted in a form. Then, the form with which the aforementioned toner image was imprinted by the ablation corotron 15 is exfoliated from a photo conductor 11. The form which exfoliated from the photo conductor 11 is supplied to fixing equipment (not shown) after that, and it is fixed to the toner image on a form.

[0049] The toner 19 which remained on the photo conductor 11 aforementioned front face is discharged by the cleaning corotron 16, and fails to be further scratched with the DESUTA bar brush 20 of cleaning KUYUNITTO 17. The toner 19 which remained on the photo conductor 11 aforementioned front face slightly, and has adhered to it is completely removed by the aforementioned cleaning-blade assembly 3 which **** photo conductor 11 front face.

[0050] In addition, if negatives are developed for every color, respectively and a color toner image is imprinted in a form in a development process using 2 of a Magenta, yellow, a cyano toner, and a black toner, or four sorts when two or more development units 13 are arranged, the picture colored the desired hue will be acquired. And when a Magenta, yellow, and three sorts of color toners of BISHIAN are used, a full color copy is obtained.

[0051] Here, the cleaning unit 17 of the above-mentioned A image formation equipment (Vivache-500:Fuji Xerox make) inside of the body shown in drawing 3 was equipped with the aforementioned clean KUBUREDO assembly 3. At this time, the aforementioned DLC layer 1a side was forced on the photo conductor 11 by the 469g press force. In this parameter condition, the aforementioned image formation equipment A was operated, copy operation was repeated, and the abrasion loss of photo conductor 11 front face after carrying out 160,000 revolutions of photo conductors 11 was measured. The abrasion loss of the aforementioned comparison article was also measured for comparison.

[0052] Consequently, the abrasion loss at the time of using a comparison article to the abrasion loss at the time of using the cleaning-blade assembly 3 of this invention having been 1.1 micrometers was 2.3 micrometers. Thus, the cleaning-blade assembly 3 of this invention became the reduction with as sharp abrasion loss as -52% as compared with the comparison article.

[0053] (Gestalt 2 of operation) After dehydrating the condensation polyester (NIPPORAN 4040) of the molecular weight 2000 which uses ethylene glycol and an adipic acid as a polymerization component as a liquefied polyurethane rubber, this polyester 100 weight section was made to react for 20 minutes in the 1 and 5-naphthylene diisocyanate 18 weight section and 130 degrees C, and the prepolymer was compounded. the liquefied polyurethane rubber of the reaction mixture which added to this prepolymer, and agitated and generated to it the 1 and 4-butanediol 2 weight section which is ***** -- high speed -- the metal mold of the centrifugal molding machine under rotation -- it slushed inside

[0054] then, a rubber Plastic solid -- the above -- the rubber Plastic solid of the shape of a cylinder which took out and was acquired from metal mold is cut to shaft orientations, it develops, and this is laid on a surface plate, and it heated for 10 hours and was made to harden in 110 degrees C The degree of hardness (JIS-A scale) of this polyurethane sheet was 80 degrees.

[0055] Hereafter, the DLC layer was formed like the gestalt 1 of operation. Moreover, the obtained cleaning blade (2mm **) was stuck on the blade with adhesives, and the cleaning BURETO assembly which has a DLC layer on a surface was manufactured (refer to drawing 1). Here, it was made to contact so that a DLC layer may touch monotonous glass G with the degree of tilt angle of 22 degrees, monotonous glass G was pulled, and sliding frictional force was measured (refer to drawing 2).

[0056] Consequently, the sliding frictional force of the comparison article which does not form the DLC layer to the sliding frictional force of the cleaning-blade assembly of this invention which has a DLC layer having been 493g was 616g. Thus, the cleaning-blade assembly of this invention decreased as compared with the comparison article as sharply [sliding frictional force] as -20%.

[0057] Furthermore, the cleaning unit 17 of the aforementioned A image formation equipment inside of the body shown in drawing 3 was equipped with the aforementioned cleaning-blade assembly like the gestalt 1 of operation. At this time, the aforementioned DLC layer was forced on the photo conductor 11 by the 469g press force, and the abrasion loss on the front face of a photo conductor was measured.

[0058] Consequently, the abrasion loss at the time of using the aforementioned comparison article to ***** of the photo conductor 11 at the time of using the cooling blade assembly of this invention having been 1.3 micrometers was 2.3 micrometers. Thus, the cleaning tab REDO assembly of this invention became the reduction with as sharp abrasion loss as -43% as compared with the comparison article.

[0059] (Gestalt 3 of operation) It included in the development unit of the 1 component development method shown in drawing 4 of image formation equipment by having used as the toner electrification blade the blade assembly manufactured with the gestalt 1 of operation, and the gestalt 2 of operation, and copy operation was performed.

[0060] As shown in drawing 4 , the photo conductor 31 prepared in image formation equipment is approached, the development unit main part 32 is arranged, and the toner 33 is held in the pars basilaris ossis occipitalis. The magnet roll (move member) 34 which can rotate freely under the development unit main part 32 is pivoted, and the magnet roll 34 is exposed in part from opening of the development unit main part 32 so that photo conductor 31 front face may be touched mostly. Moreover, the upper part in the development unit main part 32 is equipped with the blade assembly 37 which pasted up the blade electrode holder 36 formed in the upper-limit section of the toner electrification blade 35 which **** the magnet roll 34 with the zinc processing steel plate.

[0061] In the development unit shown in drawing 4 , after being charged by the electrification corotron which is not illustrated, while the photo conductor 31 with which image information was exposed rotates, it **** with the magnet roll 34. By the blade assembly 37, in a photo conductor 31, the electrostatic charge of reversed polarity is charged, and a toner 33 adheres to the magnet roll 34 concerned, and shifts to this magnet roll 34 on photo conductor 31 front face.

[0062] As compared with the case where the blade which does not have D layer is used for the blade assembly 37 since the DLC layer of low friction nature was formed in *****, wear of toner electrification blade 35 the very thing and the coating weight of the toner 33 to the blade concerned decreased sharply.

[Translation done.]

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L38: Entry 14 of 33

File: DWPI

Aug 20, 1998

DERWENT-ACC-NO: 1995-338361
DERWENT-WEEK: 199839
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TITLE: Engine coolant pump seal assembly - has diamond film coatings on cooperating surfaces of seal elements

INVENTOR: STAFFORD, R J; YONUSHONIS, T M

PATENT-ASSIGNEE: CUMMINS ENGINE CO INC (CUND)

PRIORITY-DATA: 1994US-0220267 (March 30, 1994)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
DE 69503411 E	August 20, 1998		000	F16J015/34
EP 675303 A1	October 4, 1995	E	008	F16J015/34
JP 07269342 A	October 17, 1995		008	F01P005/10
EP 675303 B1	July 15, 1998	E	000	F16J015/34

DESIGNATED-STATES: DE GB DE GB

CITED-DOCUMENTS: DE 4302407; EP 351554 ; EP 435272 ; US 4275889

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
DE69503411E	January 25, 1995	1995DE-0603411	
DE69503411E	January 25, 1995	1995EP-0100933	
DE69503411E		EP 675303	Based on
EP 675303A1	January 25, 1995	1995EP-0100933	
JP07269342A	March 8, 1995	1995JP-0048342	
EP 675303B1	January 25, 1995	1995EP-0100933	

INT-CL (IPC): F01 P 5/10; F16 J 15/34

ABSTRACTED-PUB-NO: EP 675303A

BASIC-ABSTRACT:

A seal assembly for an IC engine coolant pump has a rotating annular seat washer and a stationary sealing ring separated by an interface holding a coolant film to form a fluid-tight seal, each of the seat washer and the sealing ring being coated with a thin diamond film on a surface at the interface. Pref. the seat washer and sealing ring substrates consist of silicon carbide, silicon nitride or stainless steel. Also claimed is a method of forming the above seal assembly.

ADVANTAGE - The face seal element, formed by the diamond films, is durable and reliable, has high hardness, low friction and high thermal conductivity, resists adhesion and build-up of and damage by pptd. coolant solids, is inherently stable and reduces the interface temp. to avoid coolant boiling.

ABSTRACTED-PUB-NO: EP 675303B

EQUIVALENT-ABSTRACTS:

A seal assembly for an IC engine coolant pump has a rotating annular seat washer and a stationary sealing ring separated by an interface holding a coolant film to form a fluid-tight seal, each of the seat washer and the sealing ring being coated with a thin diamond film on a surface at the interface. Pref. the seat washer and sealing ring substrates consist of silicon carbide, silicon nitride or stainless steel. Also claimed is a method of forming the above seal assembly.

ADVANTAGE - The face seal element, formed by the diamond films, is durable and reliable, has high hardness, low friction and high thermal conductivity, resists adhesion and build-up of and damage by pptd. coolant solids, is inherently stable and reduces the interface temp. to avoid coolant boiling.

CHOSEN-DRAWING: Dwg.1/2

DERWENT-CLASS: L02 Q65

CPI-CODES: L02-H04;

WEST**End of Result Set**

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L14: Entry 1 of 1

File: DWPI

Mar 19, 1996

DERWENT-ACC-NO: 1996-205984
DERWENT-WEEK: 199621
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TITLE: Application of hard carbon film coating with improved efficiency - by coating metallic or ceramic member with hard carbon film, forming mixed layer of silicon and carbon on base by evapn., etc, giving good adhesion between film and base

PATENT-ASSIGNEE: NISSHIN ELECTRICAL CO LTD (NDEN)

PRIORITY-DATA: 1994JP-0217319 (September 12, 1994)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP <u>08074032</u> A	March 19, 1996		005	C23C014/06

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP08074032A	September 12, 1994	1994JP-0217319	

INT-CL (IPC): C23 C 14/06

ABSTRACTED-PUB-NO: JP08074032A
BASIC-ABSTRACT:

A metallic or ceramic member is coated with a hard carbon film. A mixed layer of S and C, is formed on the base surface by evapn. while applying an inert gas ion simultaneously or alternately, and forming the hard carbon film.

ADVANTAGE - The adhesion of the film and the base can be improved.

ABSTRACTED-PUB-NO: JP08074032A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.1/2

DERWENT-CLASS: L02 M13
CPI-CODES: L02-H04; L02-J01E; M13-F02; M13-F03;

WEST**End of Result Set**

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L16: Entry 1 of 1

File: DWPI

Jan 14, 1997

DERWENT-ACC-NO: 1997-128865
DERWENT-WEEK: 199712
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TITLE: Surface treatment of organic material - comprises treating material with gas plasma impressed with pulse-modulated hf electric power to improve hydrophilicity.

PATENT-ASSIGNEE: NISSHIN ELECTRICAL CO LTD (NDEN)

PRIORITY-DATA: 1995JP-0169933 (July 5, 1995)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP <u>09012750</u> A	January 14, 1997		006	C08J007/00

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP09012750A	July 5, 1995	1995JP-0169933	

INT-CL (IPC): C08 J 7/00; C23 C 14/02

ABSTRACTED-PUB-NO: JP09012750A

BASIC-ABSTRACT:

Surface treatment of an organic material with gas plasma-treated by being impressed with pulse-modulated high-frequency electric power is new.

ADVANTAGE - The surface of the surface-treated organic material is degreased or deterged to improve hydrophilicity.

ABSTRACTED-PUB-NO: JP09012750A

EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.0/3

DERWENT-CLASS: A35 L03

CPI-CODES: A11-C04E; L03-H04D;

WEST**End of Result Set**

Generate Collection

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L18: Entry 1 of 1

File: DWPI

Apr 8, 1997

DERWENT-ACC-NO: 1997-267980
DERWENT-WEEK: 199724
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TITLE: Formation of diamond-like carbon@ film - comprises exposing substrate to be deposited under plasma containing e.g. fluorine-containing gas, and forming carbon@ film on substrate

PATENT-ASSIGNEE: NISSHIN ELECTRICAL CO LTD (NDEN)

PRIORITY-DATA: 1995JP-0254949 (October 2, 1995)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP <u>09095784</u> A	April 8, 1997		006	C23C016/02

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP09095784A	October 2, 1995	1995JP-0254949	

INT-CL (IPC): C01 B 31/02; C23 C 16/02; C23 C 16/26; C23 C 16/50; C30 B 29/04

ABSTRACTED-PUB-NO: JP09095784A

BASIC-ABSTRACT:

The formation diamond-like carbon film comprises (a) exposing a substrate to be deposited consisting of an organic material under a plasma of at least one gas selected from fluorine (F)-contg. gas, a hydrogen (H2) gas, and an oxygen (O2) gas; (b) forming a carbon film on the substrate.

USE - The method forms the diamond-like carbon film on the substrate consisting of the organic material.

ADVANTAGE - Exposing the surface of the substrate under the plasma gas cleans the surface of substrate and the carbon film has good adhesion to the substrate.

ABSTRACTED-PUB-NO: JP09095784A

EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.0/3

DERWENT-CLASS: A35 E36 L02 L03 U11

CPI-CODES: A10-E05B; A11-B05; A12-W12G; E31-N03; L02-A02B; L02-H04;

EPI-CODES: U11-C05C3;

WEST**End of Result Set**

Generate Collection

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L23: Entry 1 of 1

File: DWPI

Jul 11, 2001

DERWENT-ACC-NO: 1993-191379
DERWENT-WEEK: 200140
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TITLE: Articles with protection coat of diamond-like thin film - obtd. by coating substrate with successive carbon@ interlayers having higher hardness than substrate and lower hardness than diamond

INVENTOR: NAKAYAMA, M; SHIBAHARA, M

PATENT-ASSIGNEE: TDK CORP (DENK)

PRIORITY-DATA: 1991JP-0308264 (October 29, 1991), 1991JP-0308261 (October 29, 1991)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 3187487 B2	July 11, 2001		006	C30B029/04
JP <u>05117087</u> A	May 14, 1993		006	C30B029/04
US 5707717 A	January 13, 1998		006	C03B019/02

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 3187487B2	October 29, 1991	1991JP-0308264	
JP 3187487B2		JP 5117087	Previous Publ.
JP 05117087A	October 29, 1991	1991JP-0308264	
US 5707717A	October 15, 1992	1992US-0961222	CIP of
US 5707717A	March 10, 1994	1994US-0209573	

INT-CL (IPC): C03B 19/02; C23C 16/26; C30B 29/04

RELATED-ACC-NO: 1993-191952

ABSTRACTED-PUB-NO: JP 05117087A

BASIC-ABSTRACT:

Surface of a substrate is coated with successive layers of a carbon interlayer having a hardness (Hv) of 1000 - 5000 kg/mm2 which is greater than the substrate hardness but less than the diamond hardness. Pref. the substrate material is an alloy contg. Co, Ni and/or Fe, ceramics or glass. The C interlayer has a thickness pref. of 0.02 - 3.0 microns with gradually increasing hardness toward the diamond layer, and is formed pref. through ionised vapour deposition.

ADVANTAGE - The C interlayer enables the diamond coating to be applied over substrates that are not receptive to diamond film formation.

ABSTRACTED-PUB-NO: US 5707717A

EQUIVALENT-ABSTRACTS:

Surface of a substrate is coated with successive layers of a carbon interlayer having a hardness (Hv) of 1000 - 5000 kg/mm2 which is greater than the substrate hardness but less than the diamond hardness. Pref. the substrate material is an alloy contg. Co, Ni and/or Fe, ceramics or glass. The C interlayer has a thickness pref. of 0.02 - 3.0

microns with gradually increasing hardness toward the diamond layer, and is formed pref. through ionised vapour deposition.

ADVANTAGE - The C interlayer enables the diamond coating to be applied over substrates that are not receptive to diamond film formation.

CHOSEN-DRAWING: Dwg.0/1 Dwg.0/1

DERWENT-CLASS: A32 E36 J04 L01 L02 M13 P52 P53

CPI-CODES: E31-N03; J04-A04; L02-F05;

WEST**End of Result Set**

Generate Collection

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L4: Entry 1 of 1

File: DWPI

Jun 26, 1990

DERWENT-ACC-NO: 1990-236788
DERWENT-WEEK: 199031
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TITLE: Forming electric insulator film - in which first pole is mounted on substrate
and second pole is applied with RF potential

PATENT-ASSIGNEE: FUJITSU LTD (FUIT)

PRIORITY-DATA: 1988JP-0321295 (December 19, 1988)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP <u>02166283</u> A	June 26, 1990		000	

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP02166283A	December 19, 1988	1988JP-0321295	

INT-CL (IPC): C23C 16/50; G02F 1/13; H01L 21/31

ABSTRACTED-PUB-NO: JP02166283A

BASIC-ABSTRACT:

To form an electric insulator film on a substrate (4) by plasma CVD process, the first pole (2) mounted with the substrate (4) and the sec. pole (3) impressed with radio-frequency potential (5) are disposed facing each other in pre-decided atmos., to produce thin film onto the substrate. Negative direct current bias is applied to the substrate.

ADVANTAGE - Inner stress of the electric insulator film is changed, and lowering of film forming rate is prevented.

ABSTRACTED-PUB-NO: JP02166283A

EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.1/3

DERWENT-CLASS: L03 M13 P81 U11 U14

CPI-CODES: L04-C12; M13-E;

EPI-CODES: U11-C05B2; U14-K01A2;

WEST**End of Result Set**

Generate Collection

Print

L5: Entry 1 of 1

File: DWPI

Oct 28, 1991

DERWENT-ACC-NO: 1991-358509
DERWENT-WEEK: 199149
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TITLE: Synthesising thin films of carbon nitride - by externally applying AC electric field to give gas mix. a plasma, depositing thin boron carbide film on substrate and applying negative DC

PATENT-ASSIGNEE: SUMITOMO ELECTRIC IND CO (SUME)

PRIORITY-DATA: 1990JP-0033979 (February 16, 1990)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 03240959 A	October 28, 1991		000	

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP03240959A	February 16, 1990	1990JP-0033979	

INT-CL (IPC): C01B 21/08; C23C 16/34

ABSTRACTED-PUB-NO: JP03240959A
BASIC-ABSTRACT:

Claimed is synthesising thin films of C nitride by plasma assisted chemical vapour deposition (CVD). Process comprises reacting a gas mixt. introduced into a reaction chamber comprising C atoms, N atoms, and H atoms by applying externally an AC electric field to give a plasma and deposit a thin film of B carbide on a substrate. To the substrate or to the substrate holder is applied a negative DC bias potential at the same time the external AC is applied.

Gas mixt. pref. comprises N and C at an N/C atomic ratio of 0.0001-10000 ; and gas pref. contains N, C and H atoms at atomic ratio satisfying relationship.
 $H/(C+N+H)=0.0001-0.9999$ (I).

USE/ADVANTAGE - Provides hard and chemically stable C nitride coatings on slidable parts and on abrasion resistant prods.

ABSTRACTED-PUB-NO: JP03240959A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.0/1

DERWENT-CLASS: L02 M13
CPI-CODES: L02-A06; L02-H02B2; M13-E02;

WEST**End of Result Set**

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Print

L6: Entry 1 of 1

File: DWPI

Aug 27, 1997

DERWENT-ACC-NO: 1995-002547
DERWENT-WEEK: 199739
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TITLE: Formation for mfr. of semiconductor devices - by feeding on-off modulated high frequency power between electrodes holding wafer and applying negative voltage etc

PATENT-ASSIGNEE: NISSHIN ELECTRICAL CO LTD (NDEN)

PRIORITY-DATA: 1992JP-0200220 (July 2, 1992)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 2646941 B2	August 27, 1997		005	H01L021/205
JP <u>06291048</u> A	October 18, 1994		004	H01L021/205

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 2646941B2	July 2, 1992	1992JP-0200220	
JP 2646941B2		JP 6291048	Previous Publ.
JP06291048A	July 2, 1992	1992JP-0200220	

INT-CL (IPC): C23C 16/50; H01L 21/205; H01L 21/31

ABSTRACTED-PUB-NO: JP06291048A
BASIC-ABSTRACT:

Forming thin film comprises feeding an on-off modulated high frequency power between electrodes which holds a wafer, and applying a negative voltage to the electrodes synchronously with the modulation of the power.

USE - Used for making semiconductor devices.

ABSTRACTED-PUB-NO: JP06291048A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.1/3

DERWENT-CLASS: L03 U11 V05
CPI-CODES: L04-C01B;
EPI-CODES: U11-C01B; V05-F05C1; V05-F05E5; V05-F08D1;

WEST**End of Result Set**

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L10: Entry 1 of 1

File: DWPI

Aug 19, 1991

DERWENT-ACC-NO: 1991-285422
DERWENT-WEEK: 199139
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TITLE: Contact lens coated with diamond-type carbon film - thickness of film over polymer resin body regulates lens properties e.g. scratch resistance, light transmittance etc.

PATENT-ASSIGNEE: SUMITOMO ELECTRIC IND CO (SUME)

PRIORITY-DATA: 1989JP-0330594 (December 19, 1989)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP <u>03189613</u> A	August 19, 1991		000	

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP03189613A	December 19, 1989	1989JP-0330594	

INT-CL (IPC): G02C 7/04

ABSTRACTED-PUB-NO: JP03189613A
BASIC-ABSTRACT:

A coated type contact lens has a diamond form carbon film coated in a desired distribution of thickness on part or all of the surface consisting of high polymer resin material.

Lens body of the contact lens is made of e.g. polymethyl methacrylate. The thickness of the carbon film applied to the central part of the convex side of the lens is e.g. 100-1000 Angstroms to obtain a desired light percent transmission, and to the circumferential part of the convex side and the concave side is 50-100 Angstroms sufficient for obtaining a sufficient scratch resistance and moderate oxygen permeability. The diamond form carbon film is formed by e.g. plasma CVD method.

USE/ADVANTAGE - Contact lens has good scratch resistance and ultraviolet ray interception. The characteristics of the contact lens, percent transmission, scratch resistance, etc. can be regulated by selecting thickness of diamond form carbon film formed on the surface of the contact lens.

ABSTRACTED-PUB-NO: JP03189613A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.0/3

DERWENT-CLASS: A96 D22 P81
CPI-CODES: A11-C04B2; A12-V02A; D09-C01A;

WEST**End of Result Set**

Generate Collection

Print

L11: Entry 1 of 1

File: DWPI

Jan 22, 1993

DERWENT-ACC-NO: 1993-063180
DERWENT-WEEK: 199308
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TITLE: Cleaning of wafer surface - comprises exposing wafer to gas plasma contg.
halogen in vacuum appts. and irradiating with accelerated ion beam contg. hydrogen

PATENT-ASSIGNEE: NISSHIN ELECTRICAL CO LTD (NDEN)

PRIORITY-DATA: 1991JP-0161427 (July 2, 1991)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP <u>05013394</u> A	January 22, 1993		004	H01L021/304

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP05013394A	July 2, 1991	1991JP-0161427	

INT-CL (IPC): C23G 5/00; H01L 21/302; H01L 21/304

ABSTRACTED-PUB-NO: JP05013394A

BASIC-ABSTRACT:

Cleaning wafer comprises exposing the surface of the wafer to a plasma of a gas contg.
a halogen in a vacuum apparatus, and irradiating an accelerated ion beam contg. H on
the exposed surface of the wafer.

USE - Used for pretreatment prior to forming a hard film on the wafer.

ABSTRACTED-PUB-NO: JP05013394A

EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.1/1

DERWENT-CLASS: L03 M14 U11

CPI-CODES: L04-C09; M12-B; M14-A02;

EPI-CODES: U11-C06A1B;

WEST**End of Result Set**

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Print

L20: Entry 1 of 1

File: DWPI

Feb 14, 2000

DERWENT-ACC-NO: 1997-316988
DERWENT-WEEK: 200013
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TITLE: Wiper plate - has carbon film on plate base

PATENT-ASSIGNEE: NISSHIN ELECTRICAL CO LTD (NDEN)

PRIORITY-DATA: 1995JP-0285112 (November 1, 1995)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 3008832 B2	February 14, 2000		005	C23C016/27
JP <u>09125253</u> A	May 13, 1997		006	C23C016/50

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 3008832B2	November 1, 1995	1995JP-0285112	
JP 3008832B2		JP 9125253	Previous Publ.
JP 09125253A	November 1, 1995	1995JP-0285112	

INT-CL (IPC): B60 S 1/38; C23 C 16/26; C23 C 16/27; C23 C 16/50; C23 C 16/505; C30 B 29/04

ABSTRACTED-PUB-NO: JP 09125253A
BASIC-ABSTRACT:

A carbon film is formed on the outer surface of a wiper plate base.

Also claimed is the wiper plate which is produced by forming the carbon film on the outer surface of the wiper plate base.

USE - Used in an automobile.

ADVANTAGE - The wiper plate generates less unusual noise in sliding the wiper plate with a mating member even if no oil is periodically coated on the wiper plate.

ABSTRACTED-PUB-NO: JP 09125253A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.1/2

DERWENT-CLASS: A35 A95 E36 Q17
CPI-CODES: A11-C04B2; A12-T04D; E31-N03;

WEST

Generate Collection

Print

L37: Entry 34 of 59

File: DWPI

Aug 6, 1990

DERWENT-ACC-NO: 1990-279683
DERWENT-WEEK: 199037
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TITLE: Rubber tyre - comprises surface layer of thin film diamond, diamond-like carbon or oxide of gp=III-gp=VI metal etc.

PATENT-ASSIGNEE: SUMITOMO ELECTRIC IND CO (SUME)

PRIORITY-DATA: 1989JP-0017998 (January 27, 1989)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 02197401 A	August 6, 1990		000	

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP02197401A	January 27, 1989	1989JP-0017998	

INT-CL (IPC): B60C 11/00

ABSTRACTED-PUB-NO: JP02197401A
BASIC-ABSTRACT:

Rubber tyre comprises surface layer made of extremely thin filmed diamond or diamond-like carbon of thickness 5 micro m or less or oxide, nitride, carbide or boride iwth III-VI gp. metal.

USE - Tyre, with surface improved in quality, is used for buses, trucks, cars, motorcycles, scooters and etc..

In an example a tyre has surface formed with amorphous diamond of thickness 0.1 micro m by using plasma CVD technique. Film is translucent and extremely thin so it has no apparent difference from conventional prods. but actual-run test shows that it is only half of conventional prods. in amt. of stud abrasion after 20,000 km run.

ABSTRACTED-PUB-NO: JP02197401A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.0/2

DERWENT-CLASS: A95 Q11
CPI-CODES: A12-T01B;